REMARKS

Claims 1-97 are pending after this amendment.

Applicants have amended claims 1, 6-7, 9, 14-15, 19-20, 28, 30, 32-34, 37, 86, 89, 93, and 96 in order to more particularly define the invention. The amendments were not necessitated by the claim rejections. Applicants make no admission as to the patentability or unpatentability of the originally filed claims.

The amendments and remarks presented herein are in response to the Office Action dated January 22, 2004.

The Examiner objected to the specification because it contains embedded hyperlinks. The hyperlinks have been deleted.

The Examiner rejected claims 1-38 and 93-97 under 35 U.S.C. 101 as being directed to non-statutory subject matter. The Examiner stated that the steps of claim 1 do not require structural interaction or mechanical intervention such that the invention falls within the technological arts permitting statutory patent protection. The Examiner stated that these steps do not apply, involve, use or advance the technological arts since all of the recited steps can be performed in the mind of a user or by use of pencil and paper. The Examiner further stated that nothing in the body of the claim recites any structure or functionality to suggest that a computer performs the recited steps. This rejection is respectfully traversed.

Applicants have amended the claims to more clearly recite statutory subject matter. Specifically, claims 1-38 now recite that the steps of the method are performed in a computer. Claims 93-97 now recite that the steps performed by the computer-readable code are performed in a computer. The recitations that the steps are performed in a computer appear within the body of the claims, and not merely in the preambles, thus providing sufficient structural interaction to constitute statutory subject matter.

Regarding claim 1, the Examiner acknowledged that the recited process "produces a useful, concrete and tangible result" (Office Action, page 3, third paragraph), thus fulfilling the remaining statutory requirements imposed by § 101.

Regarding claims 34 and 93, the Examiner stated that the recited process does not produce a useful, concrete and tangible result. These claims have been amended to recite "generating, based on the log likelihood ratio, a representation of the relationship between the first item and the second item." The generated representation of a relationship between items constitutes a useful and tangible result of the claimed process, thus satisfying the requirements of § 101.

For these reasons, Applicants respectfully submit that the claims, as amended, meet the requirements of § 101.

The Examiner rejected claim 86 under 35 U.S.C. 112, second paragraph, as being indefinite or failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 86 has been amended to provide sufficient antecedent basis.

The Examiner rejected claims 1, 4-27, 32, 33, 39, 42-59, 62-85, 91, and 92 under 35

U.S.C. 102(e) as being anticipated by Hosken. This rejection is respectfully traversed.

Claim 1, as amended, recites:

> "A computer-implemented method of discovering relationships between items, comprising:
>> accepting, in a computer, item selections from a plurality of users;
>> generating, in the computer, a log for each user, each log containing identifiers for the user's item selections;
>> accepting, in the computer, a query including at least one query item identifier;
>> scoring, in the computer, the user logs, responsive to a degree of occurrence of the at least one query item identifier in the user logs, to generate user log scores; and
>> determining, in the computer, at least one result item, responsive to a degree of occurrence in at least a subset of the scored user logs."

Claim 39 recites:

> "A system for discovering relationships among items, comprising:
>> a user interface for accepting item selections from a plurality of users;
>> at least one log database, coupled to the user interface, for storing a log for each user, each log containing identifiers for the user's item selections;
>> a query input device for accepting a query including at least one query item identifier; and
>> a recommendation engine, coupled to the log database and to the query input device, for scoring the user logs, responsive to a degree of occurrence, to generate user log scores, and for determining at least one result item, responsive to a degree of occurrence in at least a subset of the scored user logs. "

The claimed method and system maintain logs of users' item selections and score

the logs based on degrees of occurrence of query item identifiers in the logs. This tech-

nique provides improved relationship discovery by detecting those logs that are likely

to produce the most effective recommendations. By determining a result item respon-

sive to a degree of occurrence in a subset of the scored logs, the claimed method and

system are able to detect relationships using raw user item selection data gleaned from logs for those users that are likely to produce the most effective recommendations by virtue of their higher scores. No explicit user feedback is required in order to discover such relationships, and no external categorization or characterization of the items is needed.

Hosken fails to teach any such method or system. Hosken employs user-provided implicit and explicit ratings data for content items (Abstract), and thus requires that users actively engage in providing feedback as to whether they like or dislike content items (col. 3, lines 16-19; col. 3, lines 29-33; col. 10, lines 10-15). Hosken uses correlation of such ratings data among users to select a subset of users that is then used to provide recommendations (Abstract; col. 15, lines 41-43). There is no hint or suggestion in Hosken of storing user logs responsive to a degree of occurrence of a query item identifier, as claimed herein, nor is there any hint or suggestion of determining a result item responsive to a degree of occurrence in a scored user log, as claimed herein. Rather than discovering relationships by virtue of degrees of occurrence in user logs, Hosken generates recommendations based on user feedback (i.e. ratings data) including both implicit and explicit ratings data. Hosken is therefore unable to provide the distinct advantages of the invention claimed herein, which include for example the ability to discover relationships based on item selections without requiring any user feedback information to be considered. Furthermore, Hosken discloses no technique for employing user log scoring, as claimed herein, to determine result items based on those logs that score highly.

Claim 59 recites a computer-readable medium comprising computer-readable code for performing steps analogous to those recited in claim 1. Claims 4-27, 32, 33, 42-58, 62-85, 91, and 92 are dependent claims that variously depend from claims 1, 39, and 59, and therefore incorporate the limitations discussed above. These dependent claims also recite additional limitations that further distinguish them from the cited reference.

Accordingly, for the reasons discussed above, Applicants respectfully submit that claims 1, 4-27, 32, 33, 39, 42-59, 62-85, 91, and 92 are patentably distinct from Hosken.

The Examiner rejected claims 2, 3, 28-31, 34-38, 40, 41, 60, 61, 86-90, and 93-97 under 35 U.S.C. 103 as being unpatentable over Hosken in view of Lazarus. This rejection is respectfully traversed.

Claim 2 recites that "a significance of the occurrence is determined by a log likelihood ratio analysis and the determined result is responsive to the determined significance." Claim 2 therefore recites a technique that employs log likelihood ratio analysis to determine a significance of an occurrence and thereby to provide more accurate result items.

Claim 3 recites that "a significance of the occurrence is determined by a substantial equivalent of a log likelihood ratio analysis and the determined result is responsive to the determined significance." Claim 3 therefore recites a technique that employs a substantial equivalent of a log likelihood ratio analysis to determine a significance of an occurrence and thereby to provide more accurate result items.

Claim 28 recites that "the determined result is responsive to a significance of the occurrence of the item in at least a subset of the scored user logs." Claim 28 further recites specific submethod steps for performing a log likelihood ratio analysis.

Claim 40 recites that "the significance of the occurrence is determined by a log likelihood ratio analysis and the recommendation engine determines the at least one result item responsive to the determined significance." Claim 40 therefore recites a technique that employs log likelihood ratio analysis to determine a significance of an occurrence and thereby to provide more accurate result items.

Claim 41 recites that "the significance of the occurrence is determined by a substantial equivalent of a log likelihood ratio analysis and ... the recommendation engine determines the at least one result item responsive to the determined significance." Claim 41 therefore recites a technique that employs a substantial equivalent of a log likelihood ratio analysis to determine a significance of an occurrence and thereby to provide more accurate result items.

Claims 60 and 61 each recite a computer-readable medium comprising computer-readable code for performing steps analogous to those recited in claims 2 and 3, respectively.

Claim 86, as amended, recites that "the determined result is responsive to a significance of the occurrence of the item in at least a subset of the scored user logs, and wherein the computer-readable code adapted to determine a determined at least one result item comprises computer-readable code adapted to determine the result by a log likelihood ratio analysis submethod." Claim 86 therefore recites a technique that em-

ploys a log likelihood ratio analysis to determine a significance of an occurrence and thereby to provide more accurate result items.

The Examiner correctly stated that Hosken does not explicitly teach a significance of occurrence being determined by a log likelihood ratio analysis or substantial equivalent. The Examiner stated that Lazarus teaches the use of log likelihood ratio or equivalent analysis to determine significance of occurrence.

Lazarus teaches a technique for predictive modeling of consumer financial behavior by application of consumer transaction data to predictive models associated with merchant segments. The technique includes determining a relationship strength between pairs of merchants based on how much the observed co-occurrence of the merchants deviate from an expected co-occurrence. The expected co-occurrence is based on statistical measures of how frequently the merchants appear in transaction data or in co-occurrence events. One example of a relationship strength measure that may be used is a log likelihood ratio. (Col. 5, lines 39-48). Although Lazarus does disclose the use of a log likelihood ratio in this manner, there is no hint or suggestion of any technique for using a log likelihood ratio (or a substantial equivalent) to determine a significance of occurrence in the context of scoring a user log responsive to a degree of occurrence of a query item identifier, as claimed herein. In fact, neither Hosken nor Lazarus, taken alone or in any combination, describe the specific technique recited herein for determining a result item responsive to a determined significance of a degree of occurrence in a scored user log, wherein the significance of the occurrence is determined by a log likelihood ratio analysis (or a substantial equivalent).

Claims 29-31 depend from claim 28, and therefore incorporate all of the limitations of claim 28, including those discussed above. Claims 87-90 depend from claim 86, and therefore incorporate all of the limitations of claim 86, including those discussed above.

Claims 34-38, as amended, recite a specific technique of discovering a relationship between a first item and a second item. The technique includes the steps of:

> "determining, in the computer, a total number of item groups N;
> determining, in the computer, a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item;
> determining, in the computer, a number of item groups N_2 not in the subset of item groups;
> determining, in the computer, a number of item groups k_{11} in the subset that contain the first item;
> determining, in the computer, a number of item groups k_{12} not in the subset that contain the first item;
> determining, in the computer, a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item;
> determining, in the computer, a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item;
> determining, in the computer, a log likelihood ratio; and
> generating, based on the log likelihood ratio, a representation of the relationship between the first item and the second item."

Claims 93-97 recite computer-readable code adapted to perform steps analogous to those recited in claims 34-38. Neither of the cited references discloses the specific steps recited in claims 34-38 and 93-97. The Examiner has not indicated where in either Hosken or Lazarus such steps are disclosed. Accordingly, Applicants submit that claims 34-38 and 93-97, as amended, are patentably distinct from Hosken and Lazarus, taken alone or in any combination, and Applicants respectfully request that the 103 rejection be withdrawn. Should the Examiner elect to continue the 103 rejection of claims

34-38 and 93-97, the Examiner is respectfully requested to indicate where in the cited references the claimed invention is said to be taught.

Accordingly, for the reasons discussed above, Applicants respectfully submit that claims 2, 3, 28-31, 34-38, 40, 41, 60, 61, 86-90, and 93-97 are patentably distinct from the combination of Hosken and Lazarus.

On the basis of the above amendments, consideration of this application and the early allowance of all claims herein are requested.

Should the Examiner wish to discuss the above amendments and remarks, or if the Examiner believes that for any reason direct contact with Applicants' representative would help to advance the prosecution of this case to finality, the Examiner is invited to telephone the undersigned at the number given below.

Respectfully submitted,
Ted E. Dunning and
Bradley D. Kindig

Dated: __May 5, 2004__   By: _____
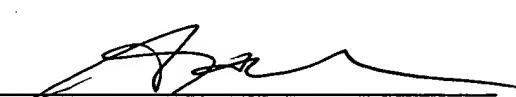
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